

REMARKS/ARGUMENTS

Claim 4 has been amended to delete the extra article "the" that was inadvertently included in the claim. The Examiner is thanked for pointing out the need for this correction.

Claim Rejections - 35 U.S.C. § 102

Turning now to the rejections based on prior art, the rejection of claims 1-8 as being clearly anticipated by EPO 0 048 508 A2 (Figs. 6 and 7) is respectfully traversed.

A unique and highly advantageous feature of the separation tray of the present invention is that the tray includes a secondary separation means as an integral part of the separation tray. The invention involves utilizing the free inner space between the primary separation devices to more efficiently separate the liquid-enriched fluid, i.e., the relatively wet secondary gas, leaving the primary separators. (Specification, page 5, lines 18-22). This is achieved using by means for removing and guiding secondary gas, such as a return skirt, to direct the wet secondary gas downwardly into the free inner space. By practice of the present invention it is possible to obtain a secondary gas that is sufficiently free of entrained liquid, that further secondary separation above the upper wall of the separation is not required, resulting in a more compact and simpler arrangement. (Specification, page 5, line 29 to page 6, line 4). The downward flow of the wet secondary gas forces the secondary gas to flow in a curved trajectory thereby maximizing the length of the flow path the secondary gas must travel, which increases the time available for separation of entrained liquid. This allows for separation of droplets of entrained liquid that are much smaller than the bulk liquid droplets separated by the primary separation device. This results in the production of a secondary gas which, preferably, has the same low liquid content as the primary gas. (Specification, page 6, lines 10-34).

The primary reference (EPO 0 048 508 A2) in Figs. 6 and 7 discloses a column tray for mixtures of liquid and gas which is similar in some respects to the separation tray of the present invention, but which is significantly different in other respects as hereinafter discussed.

Unlike the separation tray of the present invention, column tray 60 in Fig. 6 and 7 of the primary reference does not have a secondary separation means for removing entrained liquid from the secondary gas. As stated on page 10, lines 15-17 of the

primary reference: "Gas, entrained by the liquid on leaving the separating chambers 63, will flow in upward direction through the secondary gas outlet tubes 69." There is absolutely no teaching or suggestion in the primary reference of utilizing the outer space 70 surrounding apparatuses 61 for the removal of entrained liquid from the secondary gas, which is the gist of the present invention.

In the present invention, the separation of the entrained liquid from the secondary gas is accomplished in the free inner space outside of the primary separation device and between the upper and lower walls, by utilizing means for removing and guiding liquid-enriched fluid, such as a return skirt, arranged externally over the upper part of tubular conduit of the primary separation device. The means for removing and guiding the liquid-enriched fluid is arranged to admit all liquid-enriched fluid downwardly into the free inner space.

The concept of a secondary separation means, as an integral part of the separation tray, is totally lacking in the primary reference, nor would such secondary separation happen inherently since the flow of secondary gas in column tray 60 is laterally outward from the primary separation device and then upward through secondary gas outlet tubes 69 which extend at numerous points through wall 65. (EPO 0 048 508A2, page 10, lines 15-17).

It is noted that in Figs 6 and 7 of the primary reference some of the separation chambers 63 are surrounded by skirts 72 which are secured to wall 65. The purpose of these skirts is to prevent liquid discharged from one of the separating chambers 63 from hampering the liquid discharge from an adjacent separating chamber. (EPO 0 048 50A2, page 9, line 33 to page 10, line 3). There is absolutely no disclosure of utilizing these skirts to direct or guide wet secondary gas downward into the outer space 70.

Moreover, such downward flow would not happen inherently to any extent in the column tray of the primary reference, since many of the separation chambers (especially those near the circumference of the column wall) do not have skirts. (See Fig. 7 of the primary reference). Thus, the flow from these separation chambers would generally be laterally initially and subsequently upward through secondary gas outlet tubes which are dispersed throughout wall 65 above each outer space 70.

Specific limitations in claim 1 of the present application being relied to distinguish the claimed subject matter over the cited references include the following:

1. The limitation that the claimed separation tray "further comprise a means for removing and guiding liquid-enriched fluid from the primary separation device to a

secondary separation means for removing entrained liquid from secondary gas”. (As discussed above, the primary reference is not at all concerned with removing entrained liquid from secondary gas, and does not teach or suggest a secondary separation means. The secondary gas containing entrained liquid is said to flow upward through the secondary gas outlet tubes 69).

2. The limitation “wherein the secondary separation means for removing entrained liquid from secondary gas is formed by the free inner space between the upper and lower walls”. (As discussed above, the primary reference is not at all concerned with secondary separation means, and certainly does not disclose using the free inner space, i.e., outer space 70 in the reference, for this purpose.)

3. The limitation “wherein the means for removing and guiding liquid- enriched fluid is arranged to admit all liquid-enriched fluid downwardly into the free inner space”. (As discussed above, the primary reference teaches the secondary gas containing entrained liquid flows in an upward direction through secondary gas outlet tubes 69. The purpose of skirts 72 is to prevent liquid discharged from one separating chamber from hampering the discharge of liquid from adjacent separating chambers. Since the many of separating chambers in Fig. 7 don’t have a skirt surrounding them, it is clear that in the primary reference, the secondary gas containing entrained liquid will flow laterally and upward rather than downwardly into the inner free space.

For all the foregoing reasons the subject matter of claims 1-8 is not anticipated. Accordingly, the rejection of these claims under 35 U.S.C. §102 should be withdrawn, which action is respectfully requested.

Claim Rejections - 35 U.S.C. § 103

The rejection of claims 9-14 under 35 U.S.C. § 103(a) as being unpatentable over EPO 0 048 508A2 taken together with Sheinman is respectfully traversed.

For the reasons discussed above, EPO 0 048 508A2 (Figs. 6 and 7) does not substantially disclose Applicant’s invention as recited in claims 9-14. Claims 9-14 are dependent claims which indirectly depend from claim 1, and consequently contain all of the limitations recited in claim 1. The concept of utilizing the free inner space between the primary separation devices, as a secondary separation means to separate entrained liquid from secondary gas is totally lacking in the primary reference. Moreover, such secondary separation would not happen inherently in the column tray since the flow of secondary gas in column tray 60 is laterally outward from the primary separation device


and then upward through secondary gas outlet tubes 69 which extend at numerous points through wall 65.

Since EPO 0 048 508A2 does not teach or suggest the limitation in the claims that the separation tray "further comprise a means for removing and guiding liquid-enriched fluid from the primary separation device to a secondary separation means for removing entrained liquid from secondary gas", or the limitation "wherein the secondary separation means for removing entrained liquid from secondary gas is formed by the free inner space between the upper and lower walls", or the limitation "wherein the means for removing and guiding liquid-enriched fluid is arranged to admit all liquid-enriched fluid downwardly into the free inner space", the subject matter of claims 9-14 (which contain all of these limitations through their dependency on claim 1) are not obvious from the primary reference.

Sheinman, which concerns a heat-mass exchange system, adds nothing to overcome the deficiencies of the primary reference. While Sheinman may disclose some of the specific features recited in claims 9-14, Applicant is not relying on any of the specific features of claims 9-14 for patentability. Instead, Applicant is relying on the limitations discussed above, which clearly are not taught or suggested by either of the references. Accordingly, claims 9-14 are believed patentable over EPO 0 048 508A2 alone or in combination with Sheinman. Therefore, the rejection of these claims under U.S.C § 103(a) should be withdrawn.

Since all of the claims 1-14 of the present application are patentable over the cited references for the reasons discussed above, Applicant respectfully requests that a timely Notice of Allowance be issued in this case.

Respectfully submitted,
GERRIT KONIJN

By 
His Attorneys, Charles W. Stewart and
Leonard P. Miller
Reg. Nos. 34,023 and 26,004
(713) 241-0360

P. O. Box 2463
Houston, Texas 77252-2463